

§ 178.338-10

49 CFR Ch. I (10-1-02 Edition)

$$\text{RHT} = [(U_2 - U_1) W] / q$$

Where:

RHT = rated holding time, in hours

U_1 and U_2 = internal energy for the combined liquid and vapor lading at the pressure offered for transportation, and the set pressure of the applicable pressure control valve or pressure relief valve, respectively, Btu/lb.

W = total weight of the combined liquid and vapor lading in the cargo tank, pounds.

q = calculated heat transfer rate to cargo tank with lading, Btu/hr.

(iii) The MRHT (see § 178.338-18(b)(9) of this subchapter) may not exceed the RHT.

[Amdt. 178-77, 48 FR 27704, June 16, 1983; 48 FR 50442, Nov. 1, 1983, as amended at 49 FR 24316, June 12, 1984; 49 FR 43965, Nov. 1, 1984; 59 FR 55173, Nov. 3, 1994; Amdt. 178-118, 61 FR 51340, Oct. 1, 1996]

§ 178.338-10 Collision damage protection.

(a) All valves, fittings, pressure relief devices and other accessories to the tank proper, which are not isolated from the tank by closed intervening shut-off valves or check valves, must be installed within the motor vehicle framework or within a suitable collision resistant guard or housing, and appropriate ventilation must be provided. Each pressure relief device must be protected so that in the event of the upset of the vehicle onto a hard surface, the device's opening will not be prevented and its discharge will not be restricted.

(b) Each protective device or housing, and its attachment to the vehicle structure, must be designed to withstand static loading in any direction that it may be loaded as a result of front, rear, side, or sideswipe collision, or the overturn of the vehicle. The static loading shall equal twice the loaded weight of the tank and attachments. A safety factor of four, based on the tensile strength of the material, shall be used. The protective device or the housing must be made of steel at least $\frac{3}{16}$ -inch thick, or other material of equivalent strength.

(c) Each tank motor vehicle must be provided with at least one rear bumper designed to protect the cargo tank and piping in the event of a rear end collision. The bumper design must transmit

the force of the collision directly to the chassis of the vehicle. The rear bumper and its attachments to the chassis must be designed to withstand a load equal to twice the weight of the loaded cargo tank and attachments, using a safety factor of four based on the tensile strength of the materials used, with such load being applied horizontally and parallel to the major axis of the cargo tank, or within 30 horizontal degrees thereof. The rear bumper dimensions must meet the requirements of § 393.86 of this title and extend vertically to a height adequate to protect all valves and fittings located at the rear of the cargo tank from damage that could result in loss of lading.

(d) Every part of the loaded cargo tank, and any associated valve, pipe, enclosure, or protective device or structure (exclusive of wheel assemblies), must be at least 14 inches above level ground.

[Amdt. 178-77, 48 FR 27705, June 16, 1983, as amended at 49 FR 24316, June 12, 1984; Amdt. 178-99, 58 FR 51534, Oct. 1, 1993]

§ 178.338-11 Discharge control devices.

(a) Excess-flow valves are not required.

(b) Each liquid filling and liquid discharge line must be provided with a shut-off valve located as close to the tank as practicable. Unless this valve is manually operable at the valve, the line must also have a manual shut-off valve.

(c) Except for a cargo tank used to transport the following refrigerated liquids: argon, carbon dioxide, helium, krypton, neon, nitrogen, and xenon; each liquid filling and liquid discharge line must be provided with a remotely controlled self-closing shut-off valve. This requirement does not apply to a cargo tank motor vehicle certified before January 1, 1995, unless intended for use to transport flammable ladings. If pressure from a reservoir or from an engine driven pump or compressor is used to open this valve, the control must be of fail-safe design, spring-biased to stop the admission of such pressure. If the jacket is not evacuated, the seat of the valve must be inside the tank, in the opening nozzle or flange, or in a companion flange bolted to the nozzle. If the jacket is evacuated, the